



## Acknowledgements

The Clark County Urbanized Area ITS Plan was prepared with the assistance of many people. DKS Associates wishes to acknowledge all the workshop participants and the following people for participating and providing valuable input towards the preparation of this plan:

### Project Manager

Howard Long                      City of Vancouver



### Key Program Stakeholders

Kevin Gray	Clark County
Bob Hart	SW Washington Regional Transportation Council
Connie Kratovil	City of Vancouver
Eric Levison	City of Camas
Bill Pierce	WSDOT
Les Rubstello	WSDOT
Pete Van Wyhe	C-TRAN
Deb Wallace	C-TRAN



### Expanded Stakeholders

Tony Birch	Clark College
Juan Del Moral	SEH America
Jim Etzkorn	Fairway/164 <sup>th</sup> Ave. Neighborhood Association
Dan Euliss	Greater Vancouver Chamber of Commerce
Ron Gullickson	Battle Ground School District
Michael Haggerty	C-TRAN
Sgt. Keith Hyde	Vancouver Police Department
Capt. Ward Knable	Vancouver Fire Department
Dean Lookingbill	SW Washington Regional Transportation Council
Dennis Mitchell	ODOT Region 1
Sgt. Craig Randall	Clark County Sherriff's Department
Tracy Reich	Downtown Vancouver Association
Heidi Rosenberg	Port of Vancouver
Nancy Stratton	Vancouver School District
Gary Thompson	Evergreen School District
Jim Tutton	Washington Trucking Association
Lynn Valenter	Washington State University
Terry Whisler	Metro



### Workshop Presenters

Tim Wolfe	Arizona Department of Transportation
Yves Zsutty	City of San Jose
Koorosh Olyai	Dallas Area Rapid Transit
Robert Parsons	Parsons Transportation Associates
Richard Bishop	Richard Bishop Consulting
Pete Briglia	Washington State Department of Transportation



### Consultant Team

Peter Coffey	DKS Associates
Chris Long	DKS Associates
Jennifer Hoffman	DKS Associates
Jim Peters	DKS Associates
Habib Shamskhov	DKS Associates
Danella Whitt	DKS Associates
Warren Tighe	Gardner Systems
Jim West	Kimley Horn
Richard Hooper	Iteris
Arya Rohani	Iteris
Scott Chapman	Nelson Nygaard
Katlin Smith	Pacific Rim Resources
Doug Zenn	Pacific Rim Resources
David Zehrung	Sparling





# Table of Contents

Background	Page 3
Vision, Goals and Objectives	Page 8
Recommended Initiatives	Page 10
Initiative 1-Communications Infrastructure	Page 11
Initiative 2-Traveler Information	Page 13
Initiative 3-Incident Management	Page 16
Initiative 4-Transportation Management	Page 18
Initiative 5-Traffic Signal System	Page 20
Initiative 6-Transit Priority	Page 22
Initiative 7-Transit Operations and Management	Page 23
System Architecture	Page 25
Implementation Plan	Page 27
Implementation Summary	Page 46
Funding	Page 47
Glossary of Terms	Page 48



# INTELLIGENT TRANSPORTATION SYSTEM INITIATIVES

VAST (Vancouver Area Smart Trek) is a new program by public transportation agencies in Clark County (the Cities of Vancouver and Camas, Clark County, the Washington State Department of Transportation Southwest Region, the Southwest Washington Regional Transportation Council, the Port of Vancouver and C-TRAN) to implement a 20-year Intelligent Transportation System (ITS) Plan. ITS uses advanced technologies to improve the safety and efficiency of our transportation system. The VAST program partnership is being coordinated with similar efforts underway in the Portland metropolitan area to ensure ITS strategies throughout the region are integrated and complementary. This document is the Executive Summary of the VAST Final Report.



## Background

The Metropolitan Transportation Plan (MTP) for Clark County indicates that between 1960 and 1996 the population in Clark County increased by 224% and at the same time the number of registered passenger cars increased by 343%. The MTP projects that by the year 2020, the population will increase by another 44%, housing will increase by 49% and employment will increase 60% from 1998. The significant growth in our urban population and employment, coupled with reliance on the automobile and the highway system as the primary means of mobility, has placed a tremendous burden on the existing transportation infrastructure. **The increasing congestion is resulting in extensive delays, reduced productivity, wasted energy and a frustrated driving public.** At the same time, environmental constraints and the high cost of land and construction have led to the realization that we cannot rid ourselves of congestion by only building new transportation infrastructure. As the region expands, a coordinated, systematic approach will be necessary to effectively manage the region's transportation infrastructure and get the most out of the infrastructure already in place. By working efficiently and cooperatively among agencies, we can build and manage a *smarter* transportation system using Intelligent Transportation Systems (ITS).

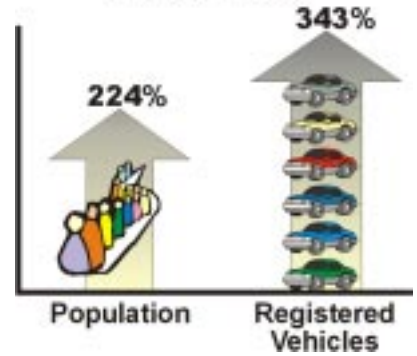
### WHAT IS ITS?

Intelligent Transportation Systems (ITS) is the application of a range of advanced technologies and proven management techniques to improve mobility and transportation productivity, enhance safety, conserve energy resources and reduce adverse environmental effects. ITS uses real-time information to integrate and manage the components of a conventional transportation system (roads, transit, ramp meters, traffic signals, etc.) ITS can perform the following functions:

- Alert motorists, commercial vehicles, and transit operators of congestion by collecting, processing, and disseminating real-time information.
- Provide real-time transit arrival and departure information to passengers allowing them to time their departure from work or home to the transit stop.
- Reduce corridor congestion by rapidly detecting and responding to traffic incidents.
- Reduce travel times, stops and delays by dynamically adjusting traffic signals in response to changing traffic conditions across jurisdictional boundaries and roadway types.

In the past, it was generally accepted that we could meet the demand for mobility by building more highways and bridges and adding more lanes to roads and streets in our cities. Today, as many areas of the country have built out the road

Growth in Clark County 1960 to 1996



ITS is the application of a range of advanced technologies and proven management techniques to improve mobility and transportation productivity, enhance safety, conserve energy resources and reduce adverse environmental effects.

system and pressure exists to curtail sprawl, we must consider new ways of managing traffic. ITS provides new tools to compliment traditional transportation thinking and the approach is catching on worldwide.

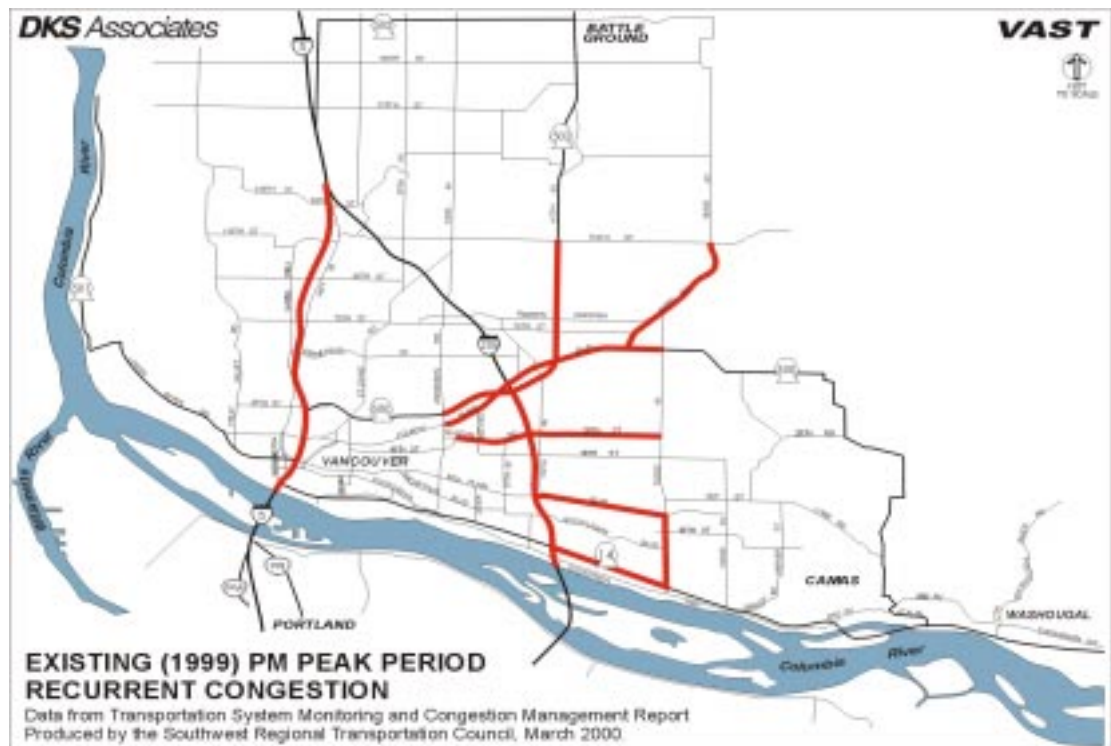
Deployment of ITS tools and strategies, seen as the next major evolutionary stage of surface transportation, is expected to be the focus of major metropolitan area implementation efforts early in this century, much like the highway system program was the focus of the last 60 years. ITS is no longer an alternative or option in dealing with congestion and increasing highway travel. It is one of the most cost effective ways to obtain a more efficient transportation system without the need to add more lanes and build more highways.

## THE PROBLEM

Traveler delay, caused or exacerbated by congestion, is on the rise in the entire region. Congestion occurs in two forms: recurrent and non-recurrent. Recurrent congestion occurs when peak period traffic demand exceeds the capacity of the roadway. Areas experiencing recurrent congestion during the peak periods today include: SR-500 from Andresen to 119th Street; SR-14 from I-205 to 164th Avenue; Fourth Plain from Andresen to 164th Avenue; Mill Plain Boulevard from I-205 to 164th Avenue; 164th Avenue from Mill Plain Boulevard to SR-14; I-5 from I-205 to the Interstate Bridge; and I-205 from SR-500 to the I-205 bridge.

Non-recurrent congestion occurs when an incident reduces capacity of a roadway by a lane blockage or shoulder activity. Incidents can include collisions, stalls or breakdowns, debris or spilled loads on the roadway, maintenance and construction activities, weather conditions and special events. Congestion due to incidents also increases the potential for secondary (and often more severe) incidents,

further compounding operational problems. Studies have indicated that delay associated with both types of congestion in the Portland-Vancouver region costs \$930 million per year in lost time, productivity, and wasted fuel. Also, further studies associate congestion with significant contributions to regional air pollution, and several studies have documented that over 50% of congestion results from incidents. ITS can help reduce the potential for incidents and speed the clearing of an incident when it occurs.





# INTELLIGENT TRANSPORTATION SYSTEM INITIATIVES

There is no single solution to transportation problems, but the “Intelligent Transportation System” is an integral part of the transportation tool kit to achieve the goals and objectives set forth in the Metropolitan Transportation Plan (MTP). The data collection, analysis, operational techniques and information sharing can become key elements of the region’s congestion management system, meeting both State and Federal urban planning rules outlined in the Washington Growth Management Act of 1991 and the Transportation Efficiency Act for the 21<sup>st</sup> Century (TEA-21) of 1998.

## THE OPPORTUNITY

ITS applications represent a significant opportunity to improve the efficiency and safety of the surface transportation system in Clark County. These applications primarily improve the operation of a transportation system by either performing a function quicker or more reliably, or by providing a service that was not previously available. In so doing, ITS provides for improved mobility of people and goods on the existing surface systems, and they offer the potential for substantial savings in future construction, particularly of highways.

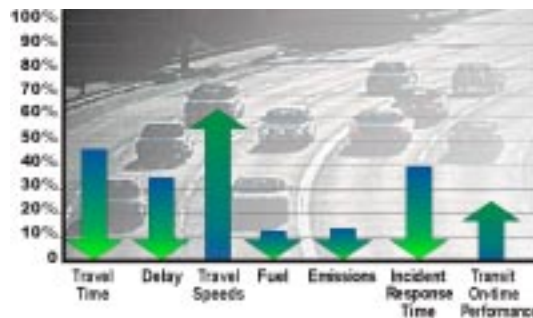
The biggest challenge to the professional and the traveler is in recognizing and appreciating the benefits that ITS can provide. This recognition is difficult because efficient operation of the highway system in particular is assumed, rather than understood. It is often assumed that, if a highway is properly designed and built, the traveling public will make safe and efficient use of it. However, failure to recognize the importance of investing in operations often results in expensive new roadway construction to deal with inefficiently managed travel demand.

### Potential Benefits

Advanced Public Transportation System	
<i>Travel Time:</i>	Decrease 15% to 18%
<i>Service Reliability:</i>	Increase 12% to 23% in on-time performance
<i>Cost Effectiveness:</i>	45% annual return on investment

Incident Management System	
<i>Incident Clearance Time:</i>	40% reduction in incident response times Decrease tow response time 5-7min.
<i>Fatalities:</i>	Decrease 10% in urban areas

Advanced Traffic Management System	
<i>Travel Time:</i>	Decrease 8% to 48%
<i>Travel Speed:</i>	Increase 16% to 62%
<i>Vehicle Stops:</i>	Decrease 0% to 35%
<i>Delay:</i>	Decrease 17% to 37%
<i>Accident Reduction:</i>	Decrease 10% to 50%
<i>Fuel Consumption:</i>	Decrease 6% to 12%
<i>Emissions:</i>	Decrease 5% to 13% in CO emissions



## ORIGIN OF THE VAST PROGRAM

The Vancouver Area Smart Trek (VAST) program was originally initiated by the City of Vancouver under the title of Transportation Information Management and Control Systems (TIMACS). During development of the Strategic Plan the program became known as Vancouver Area Smart Trek or VAST. The first phase in the VAST program is the development of this plan for the Clark County urbanized area which includes input from the City of Vancouver, City of Camas, Clark County,

WSDOT, Southwest Washington RTC, the Port of Vancouver and C-TRAN.  
The purpose of the VAST Plan is to:

- Identify regional transportation problems and needs
- Identify potential ITS solutions
- Coordinate both current and future ITS initiatives
- Foster interagency cooperation and coordination
- Provide an implementable program which allows the region to proceed with ITS deployment in a systematic manner.

Substantial planning, analysis, research and agency review was conducted over a 12-month period to produce the VAST Final Report. Now, the VAST implementation effort is already moving forward. The VAST program has received Congestion Management and Air Quality (CMAQ) funding to begin the first phase of ITS deployment in the Clark County urbanized area. The VAST report includes seven initiatives where additional detail and background regarding the strategic plan can be found.

- 1 **Communications Infrastructure**
- 2 **Traveler Information**
- 3 **Incident Management**
- 4 **Transportation Management**
- 5 **Traffic Signal System**
- 6 **Transit Priority**
- 7 **Transit Operation and Management**



Workshops consisting of agency personnel, emergency personnel, and citizens were held to identify needs.

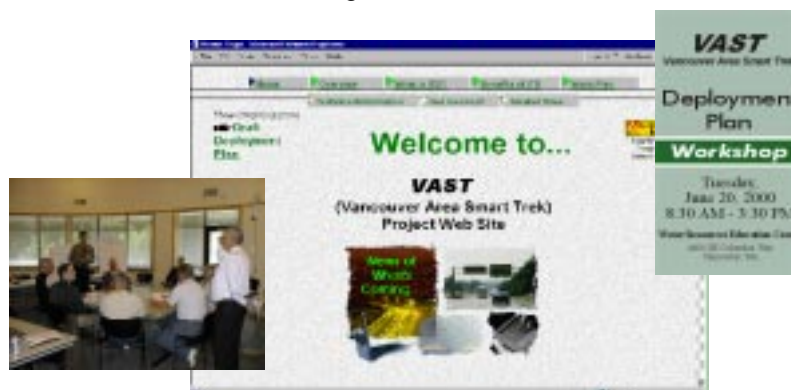
## VAST WORK PROGRAM

Public outreach and involvement has been an integral part of the VAST Work Program. The public outreach campaign has been active through the entire program. It has included the following:

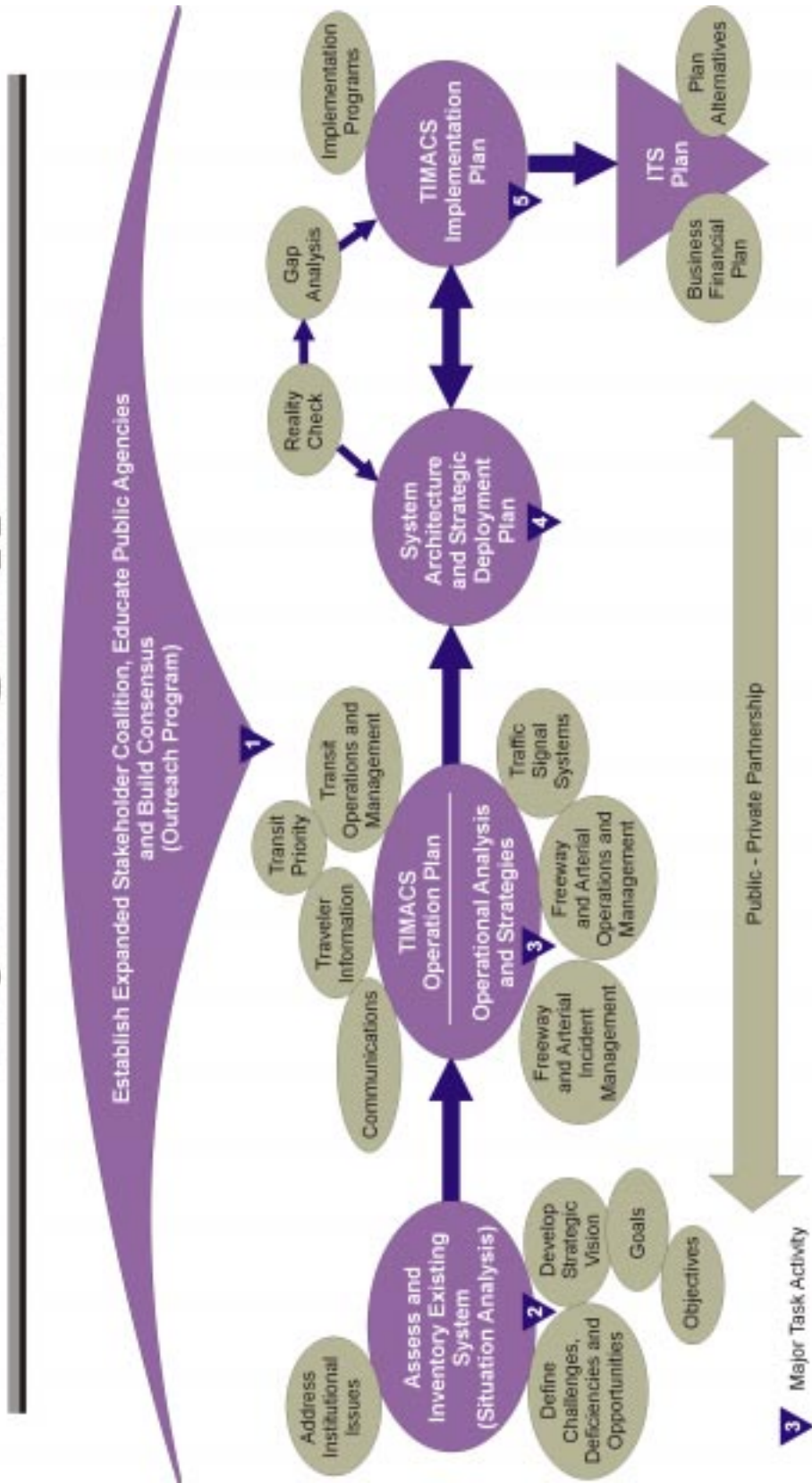
- Monthly steering committee meetings;
- A web site ([www.vasttrek.org](http://www.vasttrek.org)) for disseminating information about the project;
- A newsletter in the Vancouver publication *Streetwise*;
- Interviews with stakeholders to collect information about needs; and
- Two all day workshops



The figure on the following page provides an overall illustration of the VAST Work Program including the five key tasks: outreach program, situation analysis, development of a strategic operations plan, system architecture and implementation plan. The result of the VAST Program is the Clark County urbanized area 20-year ITS Strategic Plan described in the following sections.



# Project Strategic Approach





# Vision, Goals and Objectives

Intelligent Transportation Systems can improve the safety and efficiency of our transportation system. The vision of the VAST Program is:

***TO ENHANCE TRANSPORTATION MOBILITY, EFFICIENCY AND SAFETY, PROMOTING ECONOMIC PROSPERITY AND LIVABILITY THROUGH THE USE OF ITS TECHNOLOGIES AND INTEGRATION OF CLARK COUNTY TRANSPORTATION SYSTEMS.***

To achieve this vision the VAST Program proposes to use ITS technologies to integrate transportation management systems (traffic control centers), transportation control systems (traffic signals, ramp meters) and transportation information systems (web sites, cameras, dynamic message signs).

The goals and objectives of the VAST Program include:

## **Goal #1: Build consensus among the ITS Steering Committee Members and expanded stakeholder coalition.**



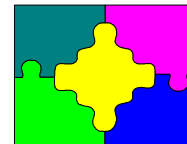
*Objectives: We strive to attain this goal by...*

- Building consensus among ITS Steering Committee members
- Building coalition among all ITS stakeholders in the county
- Developing a partnership program to promote private engagement and investment
- Conducting workshops, educating the public and developing outreach programs
- Assuring program continuation
- Integrating with other transportation and ITS plans in the region
- Adhering to the Bi-State ITS plan

## **Goal #2: Develop an efficient transportation system.**

*Objectives: We strive to attain this goal by...*

- Defining a 20-year ITS strategic plan for the Vancouver area transportation system infrastructure to be updated every three to five years
- Defining a system architecture that would be cost effective, allowing for future expansion and evolutionary ITS deployment
- Identifying and resolving institutional issues that may delay or prevent deployment of ITS within the region
- Establishing performance criteria that would allow or refine performance evaluation measures
- Selecting specific ITS market packages that satisfy the specific user needs in the County





## **Goal #3: Deploy a functional and cost efficient ITS plan for urbanized Clark County.**

*Objectives: We strive to attain this goal by...*

- Identifying implementation and operational strategies for the overall countywide ITS program containing a number of ITS prioritized projects
- Defining a system architecture that allows open, flexible and modular system integration
- Allowing for a phased implementation process
- Assuring the ITS deployment funding plan is appropriate, realistic and attainable
- Establishing the framework of institutional coordination/interoperability arrangements, and mutual agreements among agencies
- Developing an expenditure and implementation plan to deploy the defined ITS infrastructure and architecture



## **Goal #4: Deploy an ITS plan that will improve the safety of the roadways in urbanized Clark County.**

*Objectives: We strive to attain this goal by...*

- Providing a system that helps reduce driving conditions that are subject to accidents
- Establishing safety mechanisms on the roadway that provide drivers and system operators with more information about roadway condition
- Providing emergency response agencies with detailed information about incidents on the roadways





## Recommended Initiatives

Based on stakeholder input and key findings from system evaluations, the ITS elements recommended for implementation in Clark County have been organized and described by the following initiatives:



Communications Infrastructure  
 Traveler Information  
 Incident Management  
 Transportation Management  
 Traffic Signal System  
 Transit Priority  
 Transit Operation and Management



Each initiative is often dependent on elements from another initiative and involves functions and issues that span all initiatives. For example, communications infrastructure is required to provide real-time traveler information. This same infrastructure can be used to dynamically adjust traffic signals and/or advise transit operators of alternate routes. Each initiative is summarized in the following sections and presents a set of strategies developed to achieve the vision and goals of the VAST Program. Many of the systems and projects identified in the strategies require a coordinated and integrated effort by the regional stakeholders to best meet the needs of the citizens.

The following information is provided within each initiative:

- Needs:** Transportation needs identified through stakeholder interviews and workshops.
- Criteria:** In which effectiveness of each project can be evaluated.
- Strategies:** Steps developed to meet the identified needs and achieve the vision and goals of the VAST Program.

The strategies listed under each initiative have not been prioritized in any order other than how they were developed to address the identified needs. The recommended strategies presented under each category have been translated into a prioritized list of projects for the Implementation Plan on page 29. Each project is defined by a reference number based on its category abbreviation (i.e., TM-1 refers to the Transportation Management Project #1). The project list provides the proposed building blocks to assist Clark County stakeholders in achieving the VAST Program vision.

## Initiative 1

### Communications Infrastructure

Communications infrastructure is the backbone for all ITS deployment. The Vancouver, Washington area has some unique characteristics with regard to telecommunications facility development. The region has recently begun deployment of high bandwidth communication media such as fiber optics, but does not have nearly the infrastructure necessary to support a regional ITS system. The lack of infrastructure can be a benefit however, because the VAST Program will have the option to deploy communications in a logical format that meets the specific needs of this program instead of having to modify an existing system that may not be appropriate. Although there is a significant amount of infrastructure still needed, it is anticipated that the system will quickly develop because of other projects outside of the VAST Program that will be installing fiber optics in the region for traffic communications (e.g. Light Lanes, Highway 99 ITS Project, Mill Plain Adaptive, Burton Road ITS).



Fiber Optic Cable can be used to transmit voice, video and data

#### Needs - Communications Infrastructure

The following needs have been identified for improving communications in the Vancouver area.

- ! Provide a communication network between each of the local agencies
- ! Expand the communications network for freeway and arterial control and surveillance devices
- ! Provide network connections to schools and other key traffic generators

#### **Strategy #1: Deploy a communications network to connect all regional agencies involved in traffic and transportation management.**

Improve interjurisdictional coordination by operating and managing traffic in the region. Provide each agency with a direct communications link to all other agencies in the region for sharing video and data.

#### **Strategy #2: Install communications infrastructure for freeway and arterial ITS field equipment.**

Design and install a communications backbone for all existing and future ITS equipment on the freeways and arterials. This backbone would be used to communicate to CCTV cameras, electronic changeable message signs, traffic signals, highway advisory radio transmitters and warning signs, vehicle detectors, weather data stations and any other ITS field devices that may be deployed.

#### **Strategy #3: Coordinate communication infrastructure installation with key traffic generators.**

Install extra conduit or bandwidth to support communications between key traffic generators. Design the communications backbone to support ITS deployment at key traffic generators in the region.

#### Criteria Communications Infrastructure

Communications infrastructure provides the backbone for integrating ITS elements and devices and for distributing information. However, communications infrastructure by itself does not provide measurable benefits. The following list presents possible qualitative measures that can be used to evaluate the effectiveness of communications infrastructure.

- Supports full buildout of the VAST Program and future expansion
- Open architecture communications network
- Results in rapid deployment of ITS field devices
- Reliable and maintainable
- Makes use of compatible hardware available from many suppliers
- Accommodates seamless transition
- Cost effective
- Redundant and fault tolerant

**Strategy #4: Provide communications to emergency management services, including 911, local police and fire departments, and towing companies.**

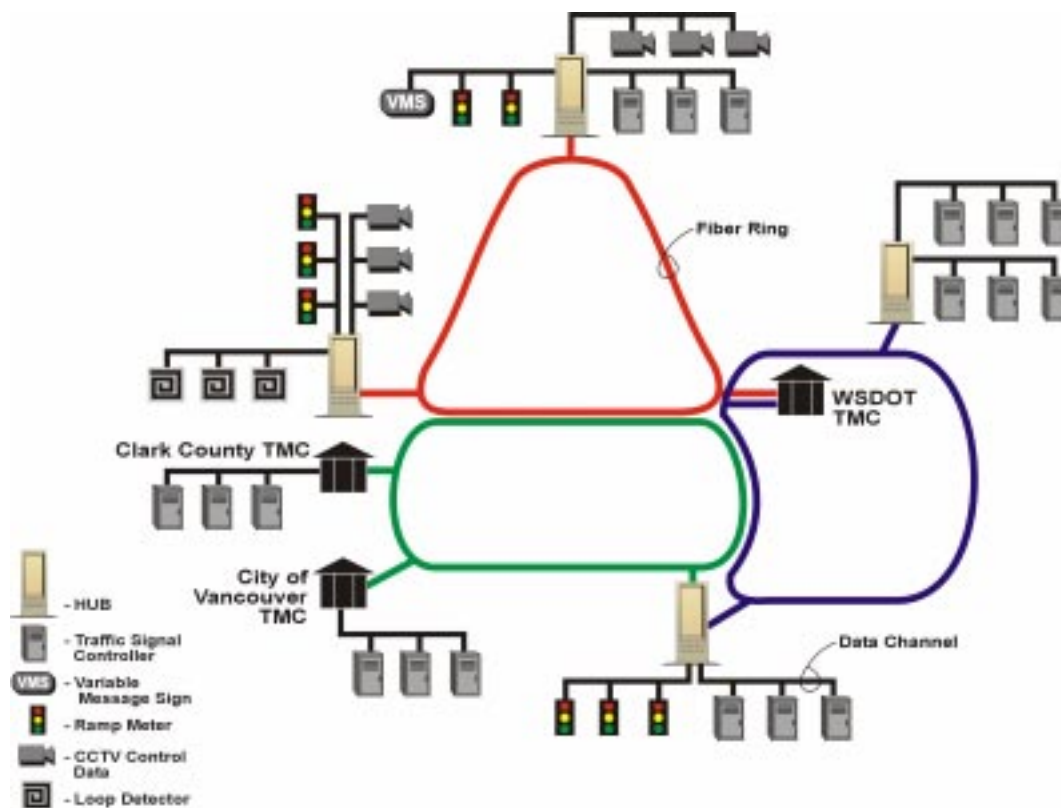
Provide a link to the communications backbone for each of the emergency management service agencies. In addition, deploy wireless communication systems for transmitting congestion and incident related information directly to the vehicles operated by each of these agencies.

**Strategy #5: Initiate a consortium of stakeholders to define, design, manage and maintain an ITS network.**

Develop a consortium of key stakeholders to operate the combined telecommunications resources. The goal of such a consortium will be to make maximum use of the bandwidth purchased for any independent use, and to permit appropriate levels of redundancy, network survivability, and cost that are unattainable in separate endeavors.



As wireless telecommunications expand their coverage and functionality, their role in transportation is becoming increasingly prevalent.



Schematic of communications configuration for field devices.



## Initiative 2 Traveler Information



Traveler information provides travelers with the ability to make an intelligent choice regarding mode, route and travel time. Advanced Traveler Information Systems (ATIS) are multimodal: a variety of technologies allow users to receive roadway, transit network, and other information important to their trip.

Traveler information assists users in selecting their mode of travel (auto, train, bus, etc.), route and departure time. Transit schedule and status information may be obtained from Transit Management Systems. Most of the roadway-based information is collected by surveillance equipment (vehicle detectors, cameras, automated vehicle location systems) and is processed by computers in transportation management centers for further distribution to traveler information systems. Other information used in traveler information systems may be static in nature, such as; map databases, emergency services information, motorist services information and tourist attractions and services. The technologies for requesting, receiving, and interacting with all of this information can be based in the home, office, passenger vehicle, commercial vehicle, transit vehicle, public transit station, or in the case of personal communication devices, can travel with a person.

### **Needs - Traveler Information**

The traveler information needs identified for Clark County are:

- ! Advertise existing and future transportation information services
- ! Use radio for broadcasting traffic conditions
- ! Provide traffic information at major employment centers
- ! Provide travel time information on freeway message signs
- ! Encourage local media to provide more traveler information about Vancouver area traffic conditions
- ! Provide a toll free telephone number for traffic conditions
- ! Tailor traffic information in response to traveler's request
- ! Provide route planning and guidance based on realtime traffic conditions
- ! Provide dynamic ride sharing and ride matching information
- ! Provide traffic/travel advisory information to drivers through in-vehicle devices
- ! Distribute traffic information via Highway Advisory Radio
- ! Monitor weather conditions with roadway sensors
- ! Promote transit with realtime arrival/departure information
- ! Provide easy to use and easy to access traveler information
- ! Provide easy to maintain traveler information components
- ! Reduce information distribution costs through public-private partnerships

### Criteria Traveler Information

The following list presents measures that can be used to evaluate the effectiveness of traveler information. The list includes both qualitative and quantifiable measures. Evaluations of performance need not quantify every measure in this list.

- Use of transit and HOV modes
- Traveler information coverage
- Integration with other ITS systems
- Accessibility of traveler information
- Information gathering costs
- Makes use of compatible hardware from multiple vendors
- Cost of information services
- Individual travel time
- Individual travel time variability
- Number of trips taken
- Number of accidents
- Number of fatalities
- Number of incidents
- Travel time savings
- Operating cost savings



Traveler Information can be provided to personal communication devices



**Strategy #1: Provide traveler information compatible with WSDOT's Seattle area ATIS system.**

Compatibility and interoperability with WSDOT's established architecture is an important consideration. VAST traveler information development costs can be significantly reduced by providing a system consistent with the Seattle area features and functionality. Seattle's effort is recognized as a leading ATIS effort. The VAST program's association with the Seattle program should be positive.

**Strategy #2: Develop traveler information compatible with the Portland area.**

Strategically and technically this is an important consideration for VAST stakeholders. As the private sector's role increases, the target "market size" becomes even more important. Therefore, it is important to work collaboratively with the City of Portland and ODOT in development of a joint traveler information program serving a much larger market. Although this approach introduces additional institutional and political challenges, its future benefits outweigh the initial costs.



**Strategy #3: Develop a web site for displaying a congestion map of the region including incident data, video images, construction and weather information.**

A simple and functional web site is one of the most effective traveler information tools available. The Smart Trek web site ([www.smarttrek.org](http://www.smarttrek.org)) for the Puget Sound Region is a prime example of this. It is perhaps the nation's most successful traveler information web site as evidenced by its growing number of users. Once again, integration of the web site content with the Portland area's database will enhance its effectiveness substantially.

**Strategy #4: Deploy Highway Advisory Radio (HAR) transmitters for major interchanges in the Vancouver area.**

Highway Advisory Radios can be deployed quickly and relatively inexpensively to provide motorist information. They have limited range and therefore must be located in and around major interchanges for maximum benefit.

**Strategy #5: Provide real-time traffic information to the local fire and police departments and 911 dispatch.**

Besides motorists, emergency service providers are important customers of real-time and accurate traveler information. A comprehensive traveler information program must address this important feature early on in order to ensure interoperability with various emergency management systems in place.

**Strategy #6: Improve use of radio broadcasting and local media coverage of Vancouver area traffic conditions.**

Commercial information providers demand the largest media market possible to take advantage of economies of scale. The VAST program can be more effective in seeking additional broadcast coverage by coordinating its efforts with the City of Portland and ODOT.



Changeable message signs (CMS) located in strategic locations along highways provide information to motorists about potential delays ahead.

**Strategy #7: Provide real-time traffic information to devices such as kiosks, hand held PCs, pagers and in-vehicle displays.**

Information kiosks have proven quite effective in specific locations such as transit/train stations, airports, regional malls, special event generators and other key activity centers. These kiosks will have accurate, real-time information and can be financed through various advertising models. Hand-held devices, such as PDAs, and in-vehicle information appliances are fast becoming popular channels of traveler information. Partnership with the private sector will be the key success factor in this marketplace.

**Strategy #8: Initiate major traveler information project in the area for possible private sector investment.**

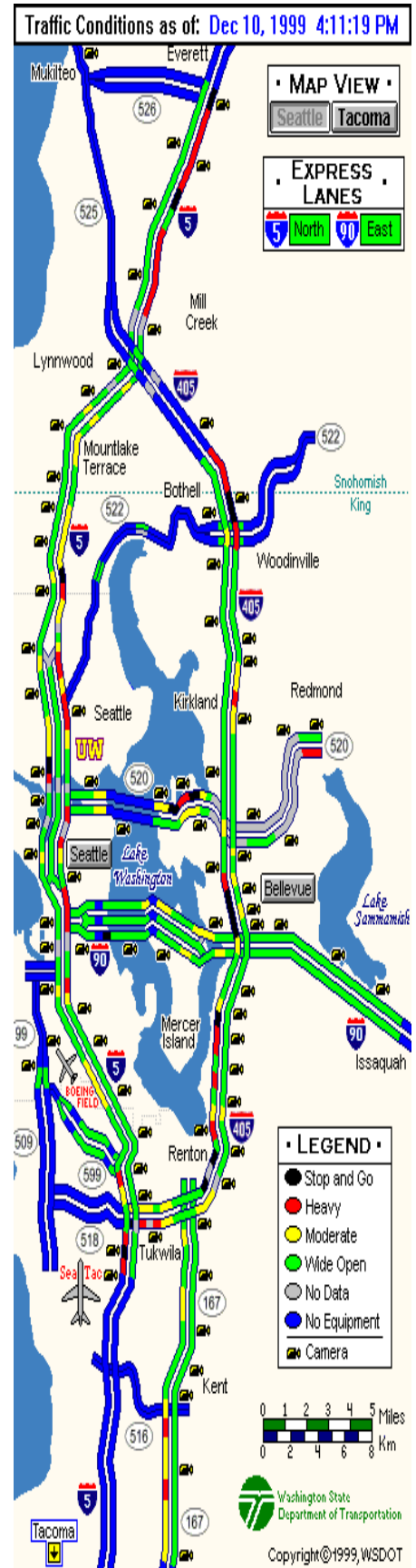
Real-time video content is very popular with commercial information disseminators, especially web site operators. A strategic investment in enhanced CCTV coverage of the Clark County area will create further private sector partnership opportunities as well as directly benefit public agencies in charge of highway operations and management.



The ODOT travel information website "TripCheck" includes roadway incident maps, camera images, a mileage calculator, and road conditions reports.



Camera images of the regional roadway network may be viewed from travel information websites.



Seattle area traffic condition map.



## Initiative 3

### Incident Management



The freeway and arterial incident management plan covers operation of any function, device or system that is dedicated to the response to or monitoring of incidents on arterials and freeways.

The only existing incident management function operated by the Vancouver region's various transportation management agencies is an incident response truck that is used by WSDOT in the Southwest Region. This truck is only dispatched when a severe incident occurs on a state highway in the WSDOT Southwest Region. This truck does not roam the freeways during the peak commute hours like the COMET trucks in Portland. Once on scene, the incident responder is only allowed to provide traffic control and help with cleanup. Because of towing company union laws, the incident response truck is not allowed to tow vehicles off of the freeway.

WSDOT and 911 Emergency Dispatch will be co-located in a new facility at SR-500/112th Avenue. This joint facility will allow these two agencies to improve their coordination while managing large incidents or regional emergencies.

WSDOT, Clark County and the City of Vancouver currently have emergency vehicle preemption equipment installed at over 95% of their traffic signals. In addition, WSDOT and Clark County are in the process of installing cameras on a section of I-5 and Highway 99 for the purpose of managing incidents and monitoring congestion. The County will also use them for monitoring their traffic signals.



Incident response vehicles patrol the highway to offer roadside assistance and to clear travel lanes, medians, and shoulders.

#### Criteria

##### Incident Management

The following list presents measures that can be used to evaluate the effectiveness of incident management projects. The list includes both qualitative and quantifiable measures. Evaluations of performance need not quantify every measure in this list.

- Integration of transportation systems
- Number of incidents
- Number of accidents
- Number of injuries
- Number of fatalities
- Time between incident and notification
- Time between notification and response
- Time between arrival and clearance
- Medical costs
- Property damage
- Insurance costs
- Number of trips taken to non-critical incidents
- Freeway and arterial miles viewable by cameras
- Exposure to accidents and incidents
- Congestion and incident related delay
- Incident related capacity restrictions
- Operating cost savings
- Emissions savings

#### Needs - Incident Management

The following needs have been identified for improving the management of incidents in the Vancouver area:

- ! Real-time traffic and incident information to fire, police and 911
- ! Incident response vehicles
- ! Real-time congestion and incident information for dispatchers
- ! Automated incident detection
- ! Coordinated response to incidents with local agencies
- ! Tracking system for vehicles carrying hazardous materials
- ! Predefined hazardous material routes
- ! Computer aided dispatch system and wireless communication equipment for emergency response
- ! Dynamic routing of emergency vehicles based on current traffic conditions
- ! Support private sector deployment of mayday<sup>(1)</sup> system
- ! Information to residents about movement of hazardous materials in their neighborhoods



(1) A mayday system includes an in-vehicle device for determining vehicle crash locations and transmitting that information.



## **Strategy #1: Provide complete CCTV camera coverage of freeways.**

Install CCTV cameras on freeways so every mile within the region can be viewed. This will provide the local agencies with the ability to monitor incidents that occur at any point along the freeways and dispatch appropriate personnel to respond to the incidents rapidly thereby reducing the potential for secondary incidents.



## **Strategy #2: Provide CCTV camera coverage on major arterials.**

Install CCTV cameras at major congestion points and high crash locations on major arterials. The local agencies have the ability to monitor incidents and respond by dispatching the appropriate personnel and/or modifying the signal timing.

## **Strategy #3: Deploy detector stations for incident monitoring along the freeways.**

Freeway and arterial management software can be developed to automatically detect incidents based on detector information. When detector stations detect an unusually rapid increase in congestion on a roadway, the incident detection system in the freeway or arterial management software program can automatically alert the operator of a possible incident. If cameras are available in the area, the operator could select (or the system could automatically select) the best camera to view the incident.



## **Strategy #4: Deploy detector stations for incident monitoring along major arterials.**

Freeway and arterial management software can be developed to automatically detect incidents through the use of detector stations along arterials. Using the same process as described above, congestion along the arterial can be identified.

## **Strategy #5: Develop incident response plans for interagency coordination.**

For large incidents that effect multiple agencies, a response plan should be developed for managing traffic. The plan should designate the roles and responsibilities of each agency during an incident and include a method to notify each agency's traffic management center operator when the incident occurs.

Video cameras send real-time images to a traffic operations center (TOC). Operators in the TOC use the video images to identify an incident and direct the appropriate emergency response personnel to the scene.

## **Strategy #6: Deploy a fleet of incident response vehicles.**

Incidents on major freeways and arterials can result in increased congestion and increases the potential for secondary incidents. Using incident response vehicles, incidents can be cleared sooner, reducing the amount of resultant congestion.

## **Strategy #7: Install changeable message signs (CMS) approaching critical congestion points within the Vancouver region freeway and arterial management system.**

Changeable message signs have proven quite effective in communicating information to motorists. Various studies have proven their usefulness in enabling motorists to make smart travel decisions in advance of non-recurring congestion, such as those caused by incidents, hazardous spills, etc.





## Initiative 4

### Transportation Management

The freeway and arterial transportation management plan covers the operation of all functions, devices and systems installed or developed for managing freeways and arterials. Currently, the Vancouver area has the following freeway and arterial operation and management elements in use or under construction:

- Clark County and WSDOT have a shared video system for monitoring traffic on a portion of I-5 and Highway 99.
- WSDOT has one ramp meter.
- WSDOT has changeable message signs (CMS) and a highway advisory radio (HAR) transmitter for disseminating incident or event information to motorists.
- WSDOT is in the process of installing a software program for managing their freeway cameras, ramp meters, data stations and CMS.
- The City of Vancouver, Clark County and WSDOT currently have traffic signal management systems for monitoring a portion of their traffic signals.

#### **Needs- Transportation Management**

Based on input from stakeholders and through workshops, the following transportation management needs have been identified:

- ! Install variable speed limit signs for use during harsh weather conditions and/or incidents
- ! Construct a traffic management center(s)
- ! Coordinate ramp meters with traffic signals
- ! Share CCTV camera images with all regional agencies
- ! Improve traffic management during special events
- ! Provide improved parking management
- ! Provide a centrally managed data warehouse
- ! Provide network surveillance equipment such as detectors and cameras
- ! Provide real-time travel time information
- ! Improve monitoring and control capabilities for surface street equipment such as traffic signals
- ! Improve monitoring and control capabilities for freeway equipment such as cameras, detectors, ramp meters, HOV facilities, and message signs
- ! Use historic traffic data to predict roadway conditions during special events and incidents
- ! Provide electronic toll collection on any future toll roads
- ! Support private sector ventures in advanced vehicle safety systems
- ! Monitor the movement of trains near at-grade intersections in real-time

#### Criteria Transportation Management

The following list presents measures that can be used to evaluate the effectiveness of transportation management projects. The list includes both qualitative and quantifiable measures. Evaluations of performance need not quantify every measure in this list.

- Integration of transportation system
- Number of incidents
- Number of accidents
- Number of injuries
- Number of fatalities
- Lane carrying capacity
- Volume to capacity ratio
- Queue lengths
- Number of stops
- Travel time savings
- Average vehicle occupancy
- Freeway and arterial miles viewable by cameras
- Vehicle hours of delay
- Infrastructure operating costs
- Emissions savings
- Gallons of fuel consumed



Operators use traffic monitoring and surveillance equipment to identify incidents and accidents.

#### **Strategy #1: Develop an operation and management plan for freeway and arterial operation.**

This plan will provide specific information regarding organizational structure, institutional issues, procurement of elements, staffing, training, and maintenance.



nance. This plan will also address the coordination between agencies for management of traffic during special events.

***Strategy #2: Construct functional traffic management centers (TMC) for each agency in the region.***

To improve the operation of arterials and freeways, it is beneficial to have a central location at each agency that can be dedicated for operating the local freeway or traffic signal management system and for monitoring any CCTV cameras within the region. These centers can vary in size and functionality depending on the needs of the local agency.

***Strategy #3: Provide ramp meters for freeway on-ramps.***

Install ramp meters on the freeway, to reduce congestion at the merge point and maintain flow on the mainline.

***Strategy #4: Coordinate ramp meters with local traffic signals.***

Improve the operation of the ramp meters by integrating the ramp meter control software and the local signal systems to coordinate the movement of vehicles through the traffic signals that approach each meter.

***Strategy #5: Develop system to share control of all CCTV cameras with all agencies.***

It would be beneficial to the operation of interjurisdictional corridors for each agency to have the ability to track the movement of vehicles across jurisdictions. This can be done by sharing cameras with neighboring jurisdictions.

***Strategy #6: Deploy freeway operation system for controlling freeway control devices.***

Develop a freeway management system to operate all freeway ITS devices [e.g. ramp meters, CCTV cameras, changeable message signs (CMS), Highway Advisory Radio (HAR), data stations, etc.]. Use this system to generate a region wide map for displaying congestion data or travel time information.

***Strategy #7: Deploy probe vehicle system for measuring travel times.***

Collect travel time on freeways and arterials by installing transponders in vehicles and roadside monitoring stations to detect the vehicles. Travel time information is extremely useful for tracking the level of congestion on local roadways and can be distributed to drivers and emergency response vehicles to aid in route and mode selection.

***Strategy #8: Create data warehouse for storing historical traffic data.***

Create a centralized location for storing all traffic data in the region. Historic data can be used for transportation planning or for predicting traffic conditions for recurring events or incidents.

***Strategy #9: Deploy advanced parking management system.***

During special events and normal business days it is sometimes hard for drivers to determine which public parking facilities have available space. As lots and garages start to fill up, drivers can find themselves circling through numerous parking facilities trying to find the last available parking stall in the area. This problem can be alleviated through remote monitoring of parking facilities. If each facility in the area has a means for counting the number of available spaces, this data can be sent to one of the local TMCs where an operator or a parking management program could activate variable message signs in the area that direct drivers to parking facilities with available parking.



Ramp meters regulate the flow of traffic onto the freeway. Ramp meter timings can be adjusted based on traffic flow or when an incident occurs.



Video cameras can be located at critical highway locations to verify road conditions and incidents. Images from the cameras can be posted on the Internet and shared with local television channels.



## Initiative 5



### Traffic Signal System

The existing traffic signal systems in the Vancouver area, while functional, will not continue to meet the growing needs of the signal system operators and local residents. WSDOT, Clark County, and the Cities of Vancouver and Camas all operate traffic signals within the project area. Between these four agencies, there are seven different types of traffic signal controllers in use and four different remote monitoring systems used to communicate to the traffic signal controllers. The majority of traffic signals in the region do not have a communications link back to any of the agency headquarters, therefore when a change needs to be made to a timing parameter, a technician must go to each signal location in the field.

On most of the major corridors in the region, the local agencies are using either time-of-day or in a few locations, traffic responsive signal coordination to improve the progression of traffic through these corridors. The City of Vancouver is in the process of deploying Adaptive Signal Timing on a 1.5 mile section of Mill Plain Boulevard between SE 104<sup>th</sup> Avenue and Hearthwood (12 traffic signals).

#### **Needs - Traffic Signal System**

Based on input from stakeholders and through workshops, the following traffic signal system needs have been identified:

- ! Improved monitoring and control capabilities for traffic signals.
- ! Control and monitoring of traffic signals across jurisdictional boundaries.
- ! Upgrade pretimed signals to actuated.
- ! Improved signal coordination for key corridors in the region
- ! Improved signal coordination across agency boundaries.
- ! Compatible traffic signal equipment amongst all agencies
- ! Automated signal timing records database.

#### **Strategy #1: Upgrade controllers to “Advanced Traffic Controllers”.**

Older types of traffic signal controllers have limited operational capabilities. New microprocessor based Advanced Traffic Controllers (ATC) must be installed to take advantage of new features such as transit signal priority and adaptive signal timing.

#### **Strategy #2: Install traffic signal monitoring system for each local agency.**

There are four different traffic signal management systems in use between Clark County, the City of Vancouver and WSDOT and a large portion of existing traffic signals do not currently communicate to these systems. To improve the efficiency and functionality of their signal systems, each agency must upgrade their existing systems or purchase new systems in order to obtain the capability to communicate with each type of controller they have in the field.

#### **Strategy #3: Obtain/Develop unified traffic signal management system for communicating to multiple types of existing/new controllers.**

Currently, each agency has multiple brands of controllers in use. The agencies that have the ability to communicate to their local controllers are using different traffic signal management software programs to communicate to each different

#### Criteria

##### Traffic Signal System

The following list presents measures that can be used to evaluate traffic signal system projects. The list includes both qualitative and quantifiable measures. Evaluations of performance need not quantify every measure in this list.

- Number of stops
- Travel time savings
- Emissions savings
- Gallons of fuel consumed
- Vehicle hours of delay
- Integration of signal systems
- Information gathering costs
- Signal system operating costs



## INTELLIGENT TRANSPORTATION SYSTEM INITIATIVES

type of controller. Through this strategy, each agency will be provided with a signal management program that can communicate to any type of controller they are using.

### ***Strategy #4: Work with new NTCIP Center-to-Center protocol to communicate between existing signal management systems.***

Update the existing signal systems to meet new NTCIP protocols for Center-to-Center communications. A standard interface can be implemented to allow each agency to share data and resources with other agencies in the region. With this protocol each agency will not have to use the same signal management system.

### ***Strategy #5: Expand the use of signal interconnect throughout the region.***

Twisted wire pair and fiber optic signal interconnect are currently used to allow local traffic signal controllers to communicate to field masters or to a central monitoring and/or control system. With a physical communication link to traffic signals, agency personnel can upload and download data from a remote site, alarms can alert operators of problems, and timings can be monitored and adjusted.

### ***Strategy #6: Deploy Closed Circuit Television (CCTV) cameras.***

With this strategy, CCTV cameras would be installed on the major corridors throughout the region where advanced traffic signal system equipment was being operated. Fixed or pan/tilt/zoom cameras could be used to monitor traffic conditions on these roadways, collect counts, and to observe the operation of signal coordination on the corridor.

### ***Strategy #7: Implement Traffic Responsive Signal Timing on major corridors within the region.***

Traffic responsive signal timing (TRPS) would be used to adjust signal timings based on current volumes. Count stations are used to monitor traffic volumes. When the volumes reach a pre-defined level for a certain amount of time, the coordination plan is changed. Each coordination plan used is predefined, whereas with adaptive signal timing the plans are continuously being modified.

### ***Strategy #8: Install additional vehicle detection/count stations.***

Additional vehicle detection will have the following uses:

- Adaptive or traffic responsive signal timing requires additional vehicle detection: The use of an advanced form of signal timing will significantly improve the efficiency of the roadway.
- Collection of real-time congestion information for local roadways: This information could be displayed on a region wide map that could be accessed through the web or shared with local traffic reporters.
- Collection of historic volume, speed and/or occupancy data. This data can be used for transportation planning in the region and improving signal timing.

### ***Strategy #9: Implement adaptive signal timing on selected corridors within the region.***

Adaptive signal timing automatically adjusts signal timings (cycle lengths, splits, offsets) in real-time based on current traffic conditions. Adaptive timing has been shown to improve travel times, reduce stops and reduce fuel consumption compared to traditional signal timing methods. Adaptive timing requires additional detection and a communications controller on the selected corridors, as well as a central computer.



Video cameras can be located at critical highway locations to verify road conditions and incidents. Images from the cameras may be posted on a web page and shared with local television stations.



Adaptive signal timing automatically adjusts signal timings in real-time based on current traffic conditions.



## Initiative 6 Transit Priority



Public transit plays an important role in passenger transportation in Clark County. The C-TRAN bus system carries over six million passengers per year on 29 routes. Priority measures for C-TRAN buses can make transit more attractive to travelers by helping make bus travel times shorter and more consistent.

In the realm of Intelligent Transportation Systems, buses can benefit from active priority at traffic signals. C-TRAN buses currently do not receive active priority treatment at traffic signals, which would involve installation of new or upgraded equipment at traffic signals and on buses.



### Needs - Transit Priority

Based on input from the stakeholders and through workshops, the following needs have been identified:

- ! Improve travel time
- ! Coordinate the operation of transit priority equipment with local agencies
- ! Increase transit ridership
- ! Improve transit reliability in congested environments

### Criteria Transit Priority

The following list presents measures that can be used to evaluate transit priority projects. The list includes both qualitative and quantifiable measures. Evaluations of performance need not quantify every measure in this list.

- Transit ridership
- Transfer time
- Individual travel time
- Individual travel time variability
- Operates across jurisdictional boundaries
- Number of stops for transit
- Number of stops for vehicles
- Vehicle hours of delay

### Strategy #1: Provide Conditional Signal Priority for Selected C-TRAN Buses

This strategy would provide priority to only those C-TRAN buses that are running behind schedule. Instead of the emitter on the bus being permanently on, it would be switched on and off by a data processor on the bus that tracks the vehicle's schedule adherence. This would be similar to the approach planned by Tri-Met.

### Strategy #2: Upgrade Bus Detection Equipment for Distance-Sensitive Priority

This strategy would upgrade receivers (discriminators) at traffic signals, to the type that is distance (range) sensitive. This prevents the bus from being detected until it is a predetermined distance from the intersection, thus enabling priority to be implemented only when needed instead of as soon as the bus comes into view, which can be wasteful in some cases.

### Strategy #3: Extend Transit Priority to Additional C-TRAN Routes

This strategy would add emitters to buses used on additional routes – those deemed most in need of signal priority or most suited to initial implementation.





## Initiative 7 Transit Operations and Management

Based on stakeholder input and current industry trends, the VAST Program Stakeholders included the need for Advanced Public Transportation System (APTS) components as part of the VAST program. APTS technologies address two major aspects of transit operations: (1) transit traveler information systems and (2) transit agency operations and management. As with ATIS technology focused on the automobile driver, APTS traveler information technologies provide public transportation riders with information needs to make appropriate travel choices. Advances in vehicle location technologies and data communications permit the delivery of real-time bus location information to transit users via a number of modes including: bus stop signs; the Internet; freeway changeable message signs (CMS); personal communications devices; and kiosks. Most of these modes also provide information to automobile users and transit information should be integrated with traffic information.

Transit operation and management tools also benefit from technological advances and help transit providers increase efficiency and improve quality of service provided to the public. Automation and integration lead to improvements in transit service planning, emergency situation handling, operations monitoring, and vehicle maintenance record keeping.

**Needs – Transit Operation & Management**

Based on input from stakeholders and through workshops, the following transit needs have been identified:

- ! Monitor C-TRAN buses in real-time
- ! Provide transit arrival/departure information on the Internet
- ! Provide real-time transit information at transit stops and on-board transit vehicles
- ! Improve management of transit vehicle maintenance
- ! Share traveler information with other regional agencies
- ! Recommend an optimum route per travelers request
- ! Provide automated fare collection
- ! Provide additional security at transit stops and in vehicles

**Criteria**  
Transit Operations and Management

The following list presents measures that can be used to evaluate transit management and operations projects. The list includes both qualitative and quantifiable measures. Evaluations of performance need not quantify every measure in this list.

- Integration with other regional transportation system
- Increased transit ridership
- Transfer time
- Provide real-time data
- Time to board coaches
- Number of security incidents
- Time between incident and notification
- Time between notification and response
- Individual travel time
- Individual travel time variability
- Maintenance cost savings
- Quantity and quality of planning data
- Dynamic reassignment of transit vehicles

### **Strategy #1: Install Automated Vehicle Location (AVL) equipment on each bus to provide inputs into operations and traveler information systems.**

AVL equipment is required for most of the APTS technologies. Tracking vehicles in real-time provides data for computer aided dispatch (CAD) systems, schedule adherence monitoring applications and transit traveler information systems.

### **Strategy #2: Provide transit traveler information on the Internet.**

The Internet has become a widely used source of up to the minute information. In addition to providing schedules and trip planning assistance, web sites can provide current system status highlighting bus arrival information. The C-TRAN web site should display the current transit traveler information based on AVL data. This information would then be available to travelers at their place of employment, individuals leaving their homes and public displays including informa-



tion kiosks. WSDOT, City of Vancouver and other web sites should all be linked in a manner to provide current transportation options to all travelers seeking information.

### ***Strategy #3: Provide transit traveler information at key bus stops.***

Bus arrival information is of great value to transit users waiting for a bus. A visual and/or audible presentation of schedule status informs the rider whether or not he/she has missed a bus, has only a few minutes to wait or has an extensive wait ahead. This information gives the passenger options and will help attract and maintain ridership.

### ***Strategy #4: Install automated fleet maintenance management system.***

Advanced computer applications allow a transit agency to improve efficiencies at its maintenance facilities. Vehicle maintenance records, inventory levels, part procurement status and costs levels can all be maintained on an integrated system. The addition of sensors on buses permits the automatic acquisition of odometer readings, fluid levels, engine status etc. by the maintenance facility in order to improve preventative maintenance and record keeping.

### ***Strategy #5: Integrate transit operations system with regional traffic management systems.***

Dispatch systems provide the greatest benefits when all traffic and road construction conditions are available for analysis along with transit system status. Video from traffic cameras and congestion maps should be displayed at transit operations centers.

### ***Strategy #6: Integrate paratransit service dispatch with fixed-route service dispatch***

In addition to equipping fixed-route vehicles with AVL equipment, C-TRAN should provide its paratransit vehicle with the technology. Dynamic rerouting of vehicles using automatic vehicle location information and computer aided dispatch (CAD) is of great value on demand-responsive services. CAD systems help allocate the best routes and use of the most appropriate vehicle based on current vehicle locations, traffic conditions and road construction information.

### ***Strategy #7: Install automated passenger counters on all vehicles to provide continual ridership data for planning.***

Automatic passenger counters greatly increase the quantity and quality of data available to transit planners. The allocation of system resources are best done when a transit agency has a thorough understanding of current operation.

### ***Strategy #8: Provide transit traveler information to mobile devices including pagers and hand held PC's.***

Advances in communications technologies has increased the type and quantity of information available to travelers' personal communication devices. Transit system status can be delivered to pagers, cell phones and hand-held computers.

### ***Strategy #9: Install automated fare collection system.***

Starting with selected routes where passenger boarding causes (is likely to cause) delays, C-TRAN should install automated fare collection equipment. Advanced fare collection systems both speed up passenger boarding and reduce the costs of handling manual fare instruments.



Bus arrival and departure information can be provided at bus stops.



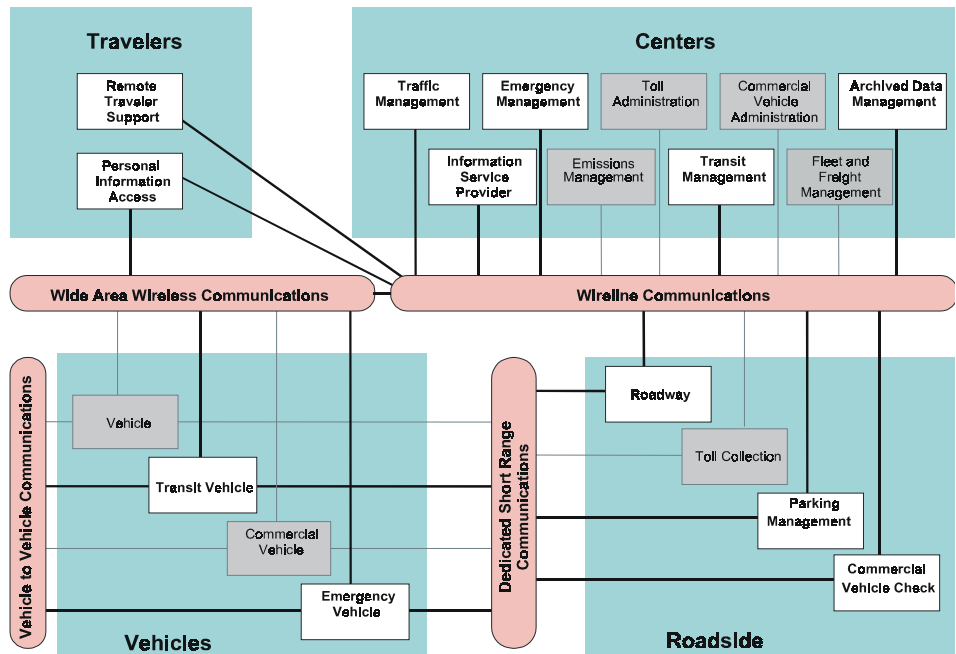
## System Architecture

The full benefits of ITS technologies cannot be realized unless systems are integrated, rather than deployed as individual components. This is why transportation professionals must now take a “systems approach” to planning, implementing and operating transportation systems.

An ITS system architecture guides the deployment of ITS by public agencies and private organizations and ensures an integrated system. The VAST system architecture has been prepared in accordance with the National ITS Architecture and standards and is consistent with other state-wide and regional architecture. The National ITS Architecture is a framework that defines the functions performed by ITS components and the various ways in which components can be interconnected to meet regional needs. The VAST system architecture will be used to help the agencies plan and design projects and deployment approaches to meet the needs of our community while keeping options open for future expansion and integration.

Transportation Equity Act of the 21st Century (TEA-21) requires that all ITS projects that receive funding from the Federal Highway Administration and the Highway Transit Fund (including the Mass Transit Account) conform to the National ITS Architecture and ITS standards. TEA-21 requires conformance because by using the National ITS Architecture as a framework for deployment Clark County can reduce development costs, time and risks, enable future expansion, enhance system performance, and adhere to national standards.

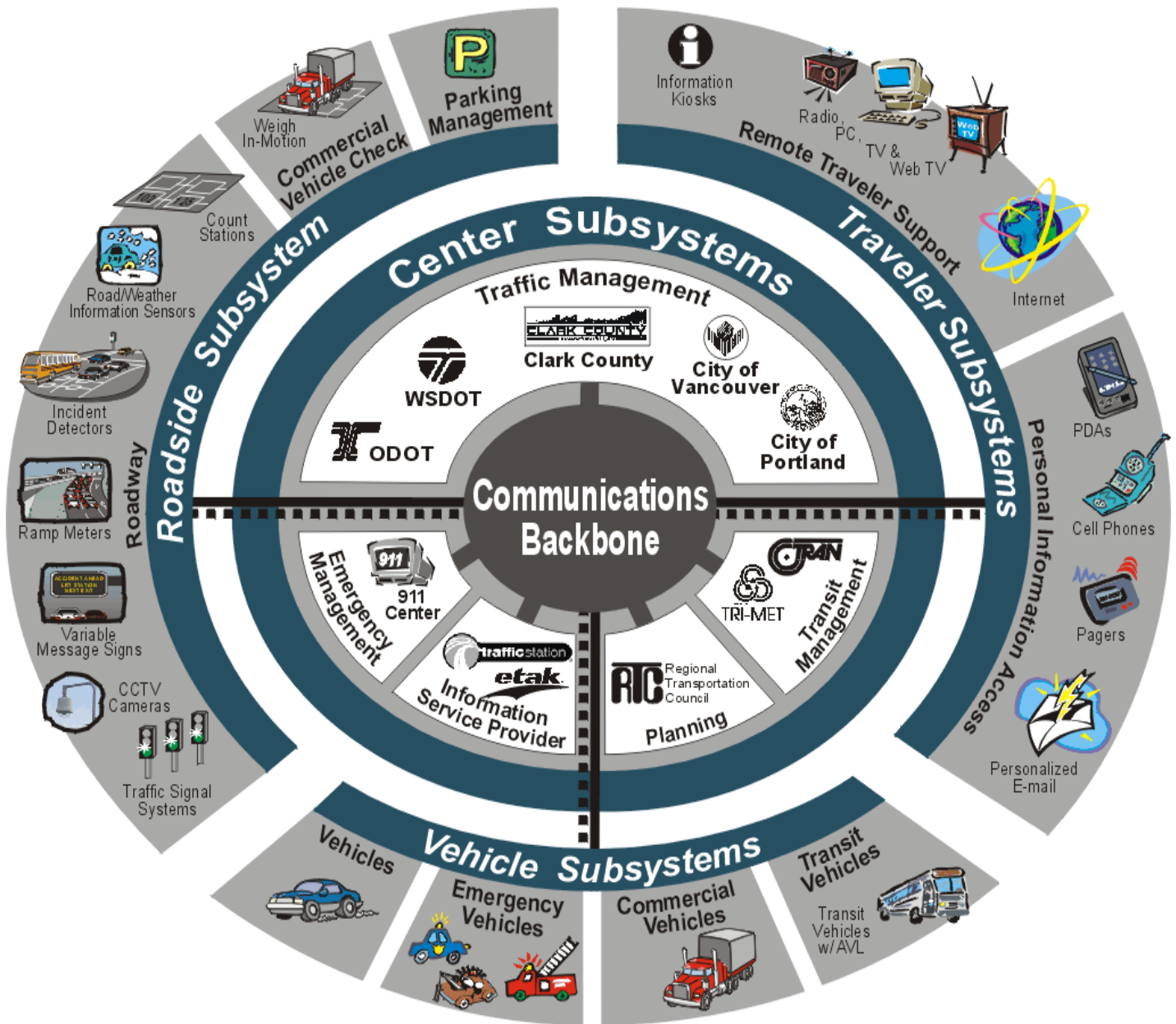
To develop the VAST system architecture, our first step involved determining the users needs and requirements. These needs have been identified through stakeholder interviews and consecutive workshops conducted in Vancouver, Washington, in February and June 2000. The diagram on the next page shows the concept of the transportation system architecture for Clark County. The concept shown in the diagram should be used as a tool to plan and design future expansions to the VAST program.



Future Clark County Regional Architecture  
"Sausage Diagram"



# Clark County System Architecture Concept





## Implementation Plan

The VAST Program is a roadmap for how to implement technology based transportation strategies in an integrated and cohesive fashion in Clark County. As indicated, the VAST program has been put together through a cooperative effort of transportation officials (agencies) in Clark County. While the VAST program incorporates many new and emerging ITS technologies, many of the systems and subsystems are not completely new to the County. In fact, transportation agencies have already implemented or planned to implement technology based solutions such as electronic signs, CCTV cameras, ramp meters, and advanced traffic signals in the county. The Clark County VAST program is a starting point for bringing these technological approaches together in an integrated and cohesive fashion. The list of projects developed for the Clark County transportation system is a progression from the program vision, to development of strategies, to priorities for specific projects.

The VAST Implementation Plan is organized into three time frames: 0-5 years; 6-10 years; and 11-20 years. Features of the plan are organized by the following categories:

- Communications Infrastructure (CO)
- Traveler Information (TI)
- Incident Management (IM)
- Transportation Management (TM)
- Traffic Signal System (TS)
- Transit Priority (TP)
- Transit Operation and Management (TO)

The list of projects is presented in Table 1. A schedule for implementation of the plan is presented in Table 2. The figures that follow illustrate conceptual locations for ITS equipment within the county.

The development of the VAST Strategic Implementation Plan was intended to broaden the thinking beyond individual agencies and serve as a catalyst for promoting greater consideration of system-wide operations and management as a part of the overall approach to meeting the needs of the Clark County transportation system. The VAST Strategic Implementation Plan should be considered:

- A mechanism for bringing the appropriate transportation agencies together within the county to evolve into an ongoing process to address traffic operations control and management in the 21st Century
- A plan to implement prioritized projects in an integrated fashion by utilizing advanced ITS technologies to enhance transportation productivity, mobility, efficiency, safety and promoting economic prosperity.

Project priorities that follow in the next several pages define which projects are likely to be implemented earlier than others. These projects have been identified in general short, medium, and long term time frames, providing flexibility for the stakeholder coalition to make adjustments in priorities in response to funding availability and other transportation needs.



Finally, the VAST program implementation plan raises challenges that we are not accustomed to in other types of traditional transportation planning and engineering. Some of the keys to successful implementation are outlined below:

- ! **PROGRAM CONTINUATION** - The VAST program must assure that the program provides for ongoing continuation through the stakeholder coalition. Fortunately, the program's stakeholder coalition has been able to secure 2.3 million dollars of Congestion Mitigation and Air Quality Improvement Program (CMAQ) funding through the Southwest Washington Regional Transportation Council (RTC) for the next three years (2001-2003).
- ! **OUTREACH PROGRAM** - ITS is relatively new and requires consensus and support by the public at large. The more the public is educated and understands the advantages of ITS, the more support there will be for the VAST program.
- ! **USE PROVEN TECHNOLOGY** - This will reduce the risk of failure and make certain that the technological applications address specific needs.
- ! **SYSTEM INTEGRATION** - Coordinate every transportation system related project with the stakeholder coalition to assure integration.
- ! **PARTNERSHIP** - Take advantage of many private sector initiatives.





































# Implementation Summary

Of the over 30 projects described in Table 1, only five or six of them could be funded through an individual grant. Most of the projects described, and the corridors and groups of elements within the projects, will need to be deployed through comprehensive multimodal and multijurisdictional projects in order to be competitive for funding. The next phase of the VAST program is a compilation of projects that address ITS needs for multiple agencies and modes in the Vancouver area. This format resulted in the project receiving one of the highest rankings in the region when evaluated for CMAQ funding. The first phase of the VAST implementation program consists of the following elements:

- Continued management, public outreach and coordination for the VAST program.
- Deployment of a Transit Management System as the backbone for future automated transit functions including vehicle tracking, schedule adherence monitoring and maintenance management.
- Deployment of Freeway Operations/Incident Management technologies including data stations, CCTV cameras, communications, Regional Traffic Management Center and variable message signs.
- Integration of Vancouver, WSDOT and Clark County traffic signals including additional interconnect.
- Development of a bi-state ATIS Business Plan.

Unfortunately, it is virtually impossible to take every project listed in the project table and combine them into multijurisdictional/multimodal implementation phases all at once because of the changing needs of the region's priorities and the varying criteria of each funding program. When grant money becomes available, the VAST Steering Committee will need to evaluate the priority given to elements and corridors within each project and compile a logical next phase for the grant application. To facilitate the combining of projects, an implementation schedule has been created to show the approximate order in which project elements should be deployed.

The total capital, engineering and annual operating/maintenance costs for the VAST Program are provided below. To maximize the benefits of the Program an on-going commitment to maintenance, and operation of the sophisticated ITS equipment and software will be needed. The ITS elements proposed with this program require consistent staffing for effective system operation, as well as requiring trained staff to do routine maintenance.

<u>Implementation Cost</u>	<u>Approximate Cost</u>	<u>Annual Costs</u>
<b><u>Implementation Phase</u></b>		<b><u>Operations &amp; Maintenance</u></b>
Phase I: 1-5 Years	\$15,000,000	\$1,600,000
Phase II: 6-10 Years	\$13,000,000	\$1,500,000
Phase III: 11-20 Years	\$17,000,000	\$1,900,000
<b>TOTAL</b>	<b>\$45,000,000</b>	

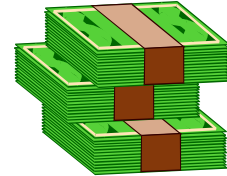
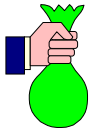
Costs above are per year for the associated phase

To stay on track to deploy the entire VAST program over the next 20 years the VAST Steering Committee will need to continually work toward pursuing grant money for the region. \$45 million over the next 20 years is a feasible goal, but it will require time and dedication from each Steering Committee Member.



## Funding

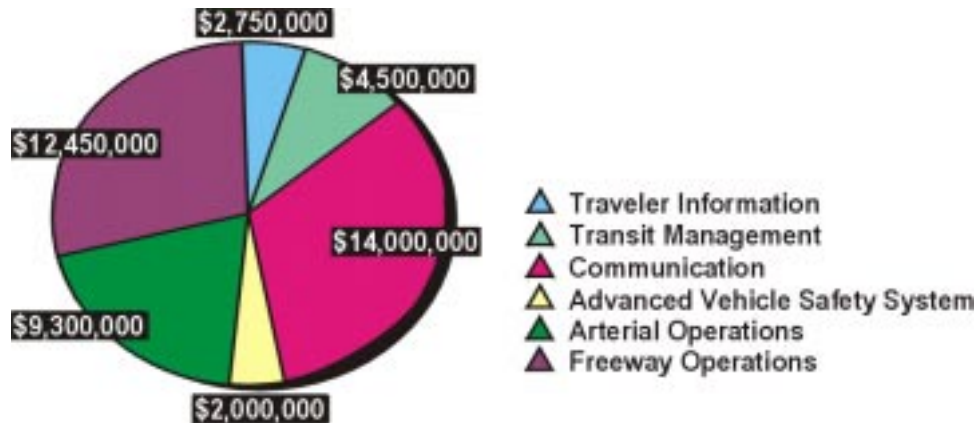
Beyond the initial funding for program planning and development of this strategic plan, a critical factor to the success of VAST will be the continued availability of funding for project implementation, operations and maintenance. It is recommended that due to the complexity of funding issues and the increase in competition for ITS grants, that funding be pursued along multiple tracks. There are four possible sources of funding: state grants, federal grants, public-private partnership and local agency annual budgeting. Very little money is available through state grants and local agency annual budgets, so it is recommended that this project focus its pursuit of grant money on federal grants and public-private partnerships.



The VAST program has already secured its first federal grant through the Congestion Mitigation and Air Quality Improvement Program (CMAQ) funding program of the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21). As discussed in the final report, this is only one of approximately 13 programs within TEA-21 that can potentially support ITS related projects.

The first step in developing a public-private partnership for funding is the execution of project TI-1, Develop Regional ATIS Business Plan. This project will help identify opportunities for partnering and will solicit interest in the region from private companies.

VAST Program Capital Costs





## Glossary of Terms

### ITS Acronym List

APC	Automated Passenger Counters
APTS	Advanced Public Transportation System
ATC	Advanced Traffic Controller
ATIS	Advanced Traveler Information System
ATMS	Advanced Traffic Management System
AVCS	Advanced Vehicle Control System
AVL	Automated Vehicle Location
CAD	Computer Aided Dispatch
CCTV	Closed Circuit Television
CMAQ	Congestion Mitigation Air Quality
CMS	Changeable Message Sign
COMET	Corridor Management Team
C-TRAN	Clark County Public Benefit Transit Authority
CVO	Commercial Vehicle Operations
DOT	Department of Transportation
DMS	Dynamic Message Sign
EMS	Emergency Management System
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GPS	Global Positioning System
HAR	Highway Advisory Radio
HAZMAT	HAZardous MATerial(s)
HOV	High Occupancy Vehicle
ISP	Information Service Provider
ITS	Intelligent Transportation Systems
NTCIP	National Transportation Communications for ITS Protocol
ODOT	Oregon Department of Transportation
PC	Personal Computer
PDA	Personal Digital Assistant
PMS	Parking Management System
RTC	Southwest Washington Regional Transportation Council
RWIS	Roadway Weather Information Systems
TMC	Traffic Management Center
TMOC	Traffic Management Operations Center
TRPS	Traffic Responsive Signal Timing
VAST	Vancouver Area Smart Trek
VMS	Variable Message Sign
WSDOT	Washington State Department of Transportation